Homological Algebra

Course: MATH 6323

Semester: Winter 2021

Instructor: Yorck Sommerhäuser

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Class meetings: Monday 1:30 pm–2:30 pm, Wednesday 4:00 pm–5:30 pm. We will meet virtually at https://mun.webex.com/meet/sommerh

Office hours: Tuesday, Thursday 1:00 pm–3:00 pm and by appointment.

Textbook: M. Suzuki: Group Theory I, Grundl. Math. Wiss., Vol. 247, Springer, Berlin, 1982 (required resource)

Course description: The course will provide an introduction to homological algebra with a focus on the cohomology of groups. The course will begin with the standard resolution used to define group cohomology, motivated by the consideration of group extensions. From the standard resolution, we will proceed to general projective resolutions and explain derived functors and the long exact homology sequence. In group cohomology, we will treat in particular the Schur-Zassenhaus theorem, central extensions, and the Schur multiplier.

Coverage: We cover § 7–9 in the second chapter of the textbook. For the more general theory, material from other textbooks on homological algebra will be used.

Homework: Beginning Monday of the second week, a weekly exercise sheet will be distributed via e-mail. This has to be submitted on the following Monday via e-mail. There will be no exercise sheets during the last two weeks of the semester. In addition, a reading assignment from the textbook will be given in every lecture.

Examinations: There will be no examinations.

Final mark: The final mark will be based entirely on the score of the exercise sheets.

Policies: You are expected to participate in every class meeting, from the beginning to the end. Attendance will be recorded, but will not count towards the final mark.

Memorial University accommodates students with disabilities and demands academic integrity. The corresponding university policies can be found at http://www.mun.ca/policy/site/policy.php?id=239 and in the Academic Calendar in Paragraph 6.12, respectively.

Prerequisites: Students need to know the basic concepts of linear algebra, like the notion of an abstract vector space over a field, and the basic concepts of group theory. No advanced group theory will be required.